Resource Utilization via Virtualization Using Virtual Box

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Abstract- Optimization refers to the mean of getting more with less. Virtualization is the method that can be used to achieve that goal by using a smaller set of hardware components. Optimization can be applied to pcs, servers, storage, network.IT leaders want a better performing, flexible and more efficient infrastructure that can reduce the cost and complexity. To meet these goals, they are turning towards virtualization. In this paper we will optimize the resources by using different virtualization techniques and virtualization software.

Keywords-*Virtualization, Virtual box, Resources utilization.*

I. INTRODUCTION

Virtualization first appeared in 1960s to enable timesharing of hardware between multiple users. Virtualization has covered large area but we focus on the server virtualization. Virtualization reduces the total cost, reduce power, increase efficiency etc. due to these reasons many company uses virtualization to build a no of different physical servers on a single virtual server. This can be achieved by using different virtual software such as virtual box, VMware, Xen etc. These software run on a shared physical environment. Virtualization allows two or more environments to run on the same physical machine such that the different environments are completely isolated from each other. Virtual machines support more flexible and finer grain resource allocation and configuration than physical machines .even the hardware cost will reduces. The server virtualization will convert the physical system into a pool of logical computing resources. Resources are allocated to the different operating system according to their needs this will increase the proper utilization of hardware and software resources. Many research have been done in the optimization of cost and resources but that is not sufficient. Hence a study of cost optimization using the virtual machine will help in understanding the application. This study will help to take an accurate decision and to optimize the total cost.

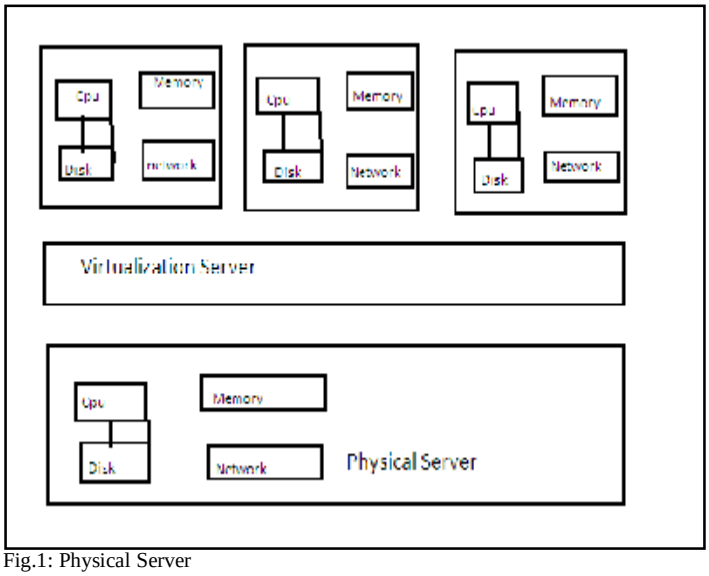

Fig.1: Physical Server

II. CHARACTERISTICS OF VIRTUALIZATION

Characteristics of virtualization are:

A. Equivalent

Virtualization makes the software run on virtual machine run like the original machine.

B. Efficiency

Virtualization increases the performance of a system by creating virtual environment that will increase the efficiency of the system and reduce the implementation cost.

C. Resource Control

Virtualization provides the resources according to the need of the operating system. It will allocate or deallocate the resources.

III. TYPES OF VIRTUALIZATION

A. Operating System Virtualization

Operating System Virtualization is a type of Virtualization that allows running and installing any kind of Operating system like Windows 7 or a Linux distro on an existing operating system. It requires a Virtual Machine Manager (VMM) which allows installing and managing multiple operating systems running simultaneously. Many companies like Microsoft, Intel. VMware uses virtualization to reduce the number of physical machines in their data centers without reducing the number of underlying application.

B. Application Server Virtualization

Server virtualization is used to allocate resources from a logical perspective in which multiple servers run in parallel, allowing multiple OS to run on one platform and application to work independently. Application Server Virtualization has been around since the first load balancer, which explains why "application virtualization" is often used as a synonym for advanced load balancing. The core concept of application server virtualization is best seen with a reverse proxy load balancer: an appliance or service that provides access to many different application services transparently.

C. Desktop Virtualization

Desktop virtualization is a method in which desktop operating systems execute in a data center and users access their applications using stateless "thin-client" devices. It provides benefits in terms of data security, flexibility, and reduction of the total cost of ownership. Desktop virtualization is to replace the user's computer with a virtual one. Desktop virtualization minimizes computing on a device and moves it to a server with a change in hardware and software. Multiple virtual machines can reside on the server, each with their own applications and operating systems. This enables users to access corporate resources independent of location. Desktop Virtualization offers a way to extend the benefits of virtualization – better performance, lower TCO, higher security and greater flexibility – to the full desktop. Each desktop is supported by a physical PC that creates numerous challenges including data security; update and refresh cycles; power, heat and space consumption; and the management of local packaged applications like productivity suites and browsers, as well as home-grown applications. In practical terms, desktop virtualization [6] allows end users to access all of their data and applications without being tied down to a specific hardware device. It also allows IT departments to reduce management and support costs, along with capital expenses for desktop hardware. There are two main variants of desktop virtualization:

D. Hardware Virtualization

Hardware virtualization is very similar in concept to OS/platformvirtualization. Hardware virtualization breaks the physical hardware int smaller sagments and manages those segments. Although they fall into different classifications, both symmetric and asymmetric multiprocessing are examples of hardware virtualization. In both instances, the process requesting CPU time isn't aware which processor it's going to run on; it just requests CPU time from the OS scheduler and the scheduler takes the responsibility of allocating processor time. As far as the process is concerned, it could be spread across any number of CPUs and any part of RAM, so long as it's able to run unaffected.

E. Storage Virtualization

Storage virtualization can be divided into two categories: block virtualization and file virtualization. In Block Virtualization, multiple storage devices are consolidated, which then actually appears as a single physical storage device. This helps the administrators in many ways such as Load Balancing, optimizing performance and speed. File Virtualization, as the name suggests, is the file or directory stored within the hard drive, which is located in a data center.

The file may not be stored within personal folder; in fact the folder might not even have name, it may be located in a data center across the globe. Block virtualization is best summed up by Storage Area Network [8] (SAN) and Network Attached Storage (NAS) technologies, distributed storage networks that appears to be single physical devices.

Under the hood, SAN devices themselves typically implement another form of Storage Virtualization: RAID. iSCSI is another very common and specific virtual implementation of block virtualization, allowing an operating system or application to map a virtual block device, such as a mounted drive, to a local network adapter (software or hardware) instead of a physical drive controller. The ISCSI network adapter translates block calls from the application to network packets the SAN understands and then back again, essentially providing a virtual hard drive. File virtualization moves the virtual layer up into the more human-consumable file and directory structure level. Most file virtualization technologies sit in front of storage networks and keep track of which files and directories reside on which storage devices, maintaining global mappings of file locations. When a request is made to read a file, the user may think this file is statically located on their personal remote drive, P:\My Files\ budget.xls; however, the file virtualization appliance knows that the file is actually located on an SMB server in a data center across the globe at //10.0.16.125/finance/alice/budget-ocument/budget.xls.File-level virtualization obfuscates the static virtual location pointer of a file (in this case, on Alice's P:\ drive) from the physical location, allowing the back-end network to remain dynamic. If the IP address for the SMB server has to change, or the connection needs to be re-routed to another data center entirely, only the virtual appliance's location map needs to be updated, not every user that needs to access their P:\ drive.

IV. EXPERIMENTAL WORK

Virtualization is used to optimist the resources. The resources can be optimize by installing different operating system by creating a virtual environment on a single physical system. The resource utilization when only one operating system is used is as:

1. When we start running the base operating system window 7 the cpu utilization is shown in figure 2 is:

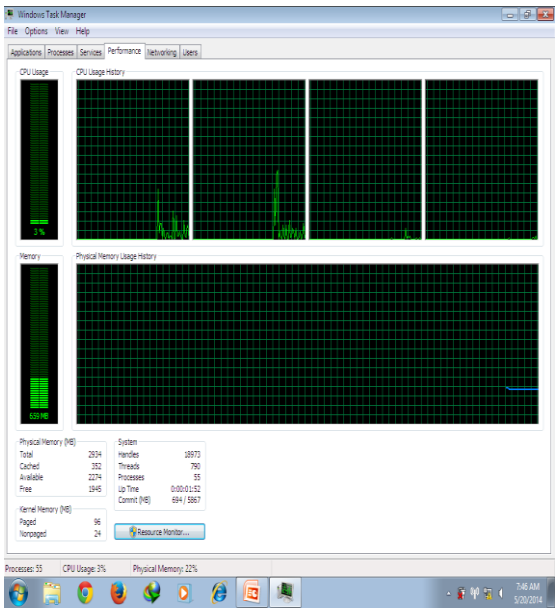

Fig 2: Resource utilization before Virtualization

2. Now installing the three different operating system Windows Xp, Android and Ubuntu by using the virtual box is shown in figure 3:

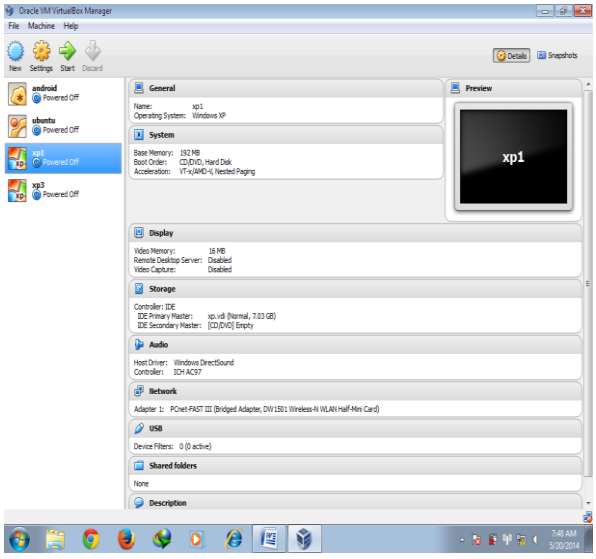

Fig.3: Virtual Box

3. After installing the three different operating system on a single system the resource utilization is increases. Initially the CPU utilization is only 3% as we start installing different operating system the resource utilization increase and become 29% as shown in figure 4:

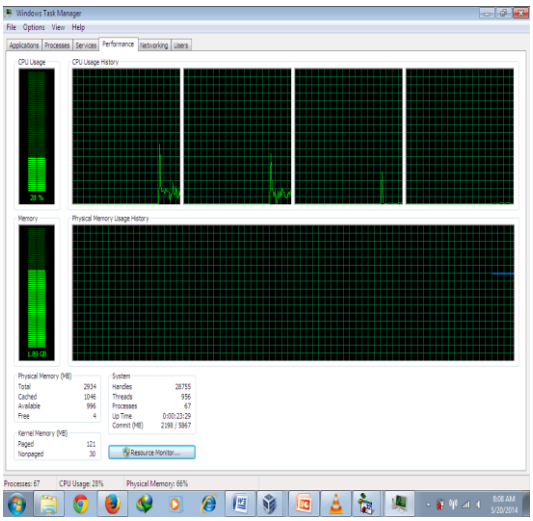

Fig.4: Resource Utilization

V. CONCLUSION

Through this research paper we have discussed the concept of virtualization and their types. These virtualization methods help in making the resource optimization and better performance of the system. The cost, performance and security is the main issue for a system the virtualization will create a virtual environment to that will help to reduce the cost and increase the overall performance of a system .this paper show how the different operating system run simultaneously on a single machine with the help of server virtualization and reduce the hardware cost of the system and increase the resource utilization. Thus the server virtualization will provide a better way to optimize the resources and cost.

VI. REFERENCES

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